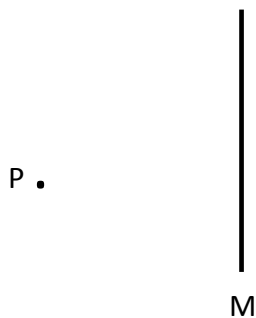


Reflections in the Plane

Important Background Question:

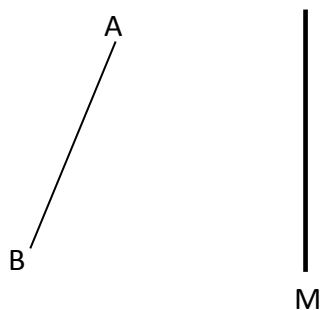
What rules of reflection must we use in order to locate the image of a point when it is reflected in a (mirror) line?

Use these rules to locate the **exact** position of the image of P as it is reflected in the mirror M:



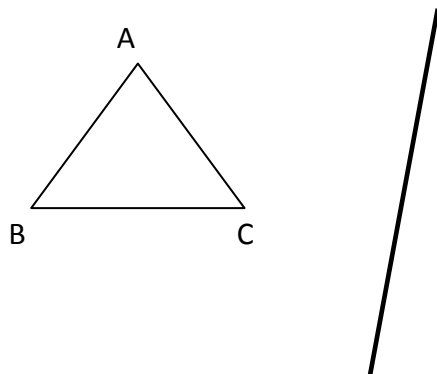
Label the image P'

Use the rules to locate the **exact** position of the image of AB as it is reflected in the mirror M:



Label the image A'B'

Use the rules to reflect the triangle ABC in the given line:

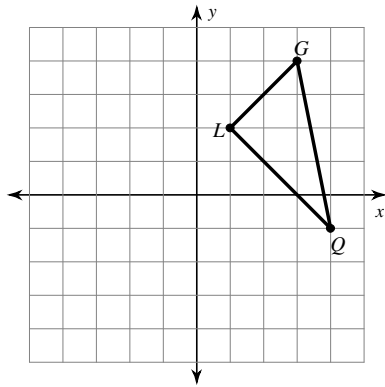


Label the image A'B'C'

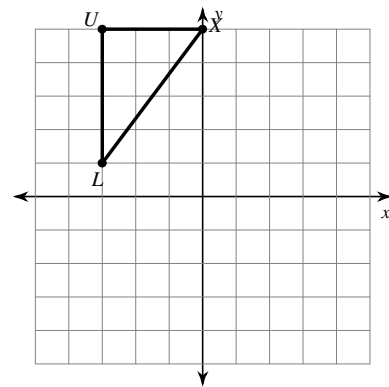
Now try these questions:

Graph the image of the figure using the transformation given.

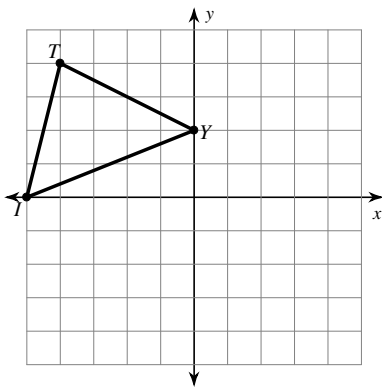
1) reflection across the x-axis



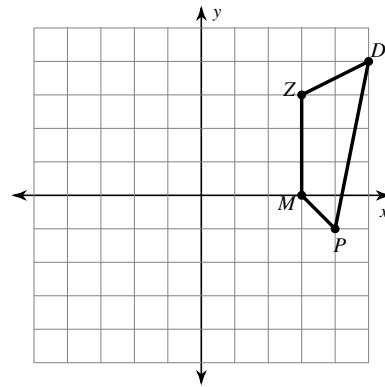
2) reflection across $y = 3$



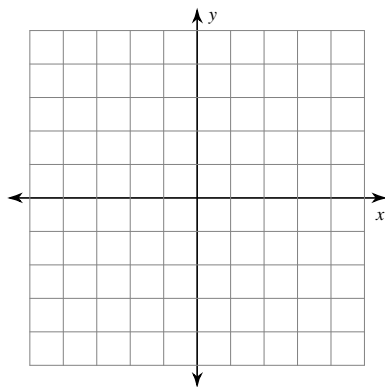
3) reflection across $y = 1$



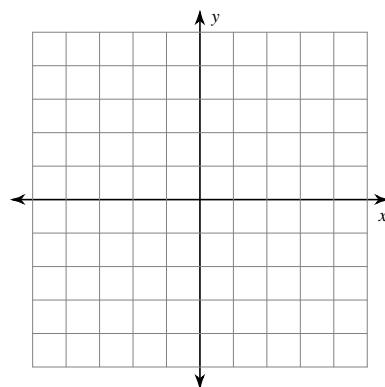
4) reflection across the x-axis



5) reflection across the x-axis
 $T(2, 2)$, $C(2, 5)$, $Z(5, 4)$, $F(5, 0)$



6) reflection across $y = -2$
 $H(-1, -5)$, $M(-1, -4)$, $B(1, -2)$, $C(3, -3)$



Find the coordinates of the vertices of each figure after the given transformation.

- 7) reflection across the x-axis
 $K(1, -1)$, $N(4, 0)$, $Q(4, -4)$

- 8) reflection across $y = -1$
 $R(-3, -5)$, $N(-4, 0)$, $V(-2, -1)$, $E(0, -4)$

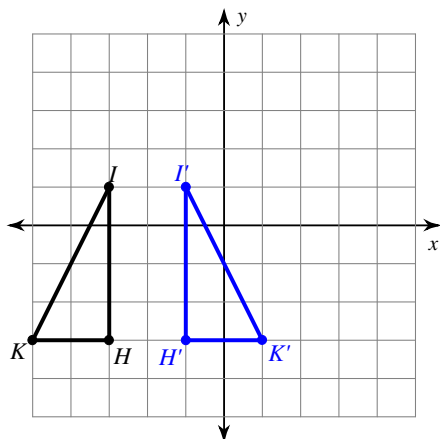
Find the coordinates of the vertices of each figure after the given transformation.

- 9) reflection across $x = 3$
 $F(2, 2)$, $W(2, 5)$, $K(3, 2)$

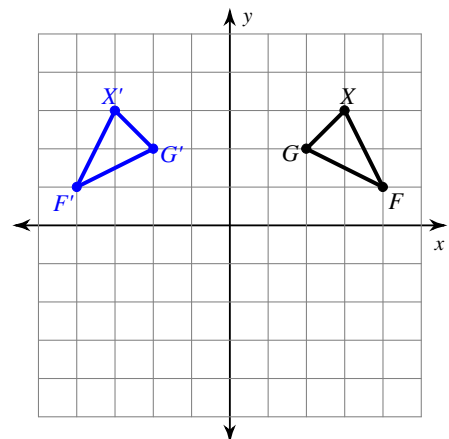
- 10) reflection across $x = -1$
 $V(-3, -1)$, $Z(-3, 2)$, $G(-1, 3)$, $M(1, 1)$

Write a rule to describe each transformation.

11)

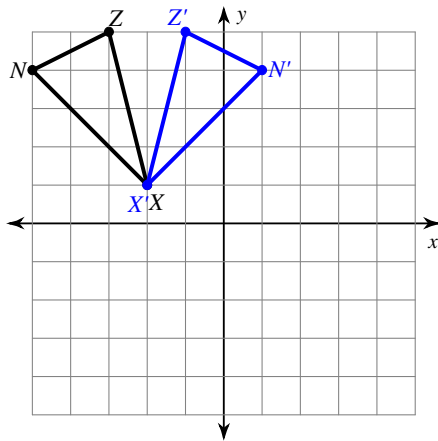


12)

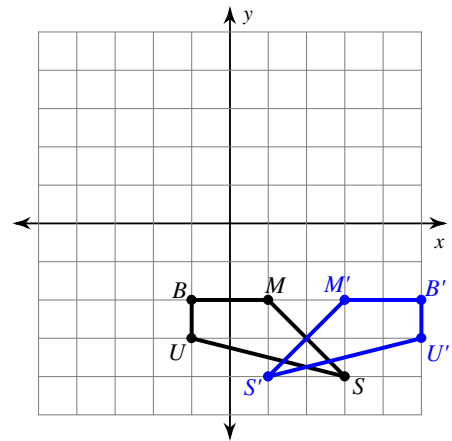


Write a rule to describe each transformation.

13)



14)



Additional Questions

1. The line AB is reflected in a mirror and an image A'B' formed. Find the **exact** location of the mirror line. Show all construction arcs.



Answer the following questions (apart from Q4) on file paper or graph paper:

2. A regular hexagon has 6 lines of symmetry.

(a) Draw a hexagon with 1 line of symmetry

(b) Draw a hexagon with 2 lines of symmetry

(c) Draw a hexagon with 3 lines of symmetry

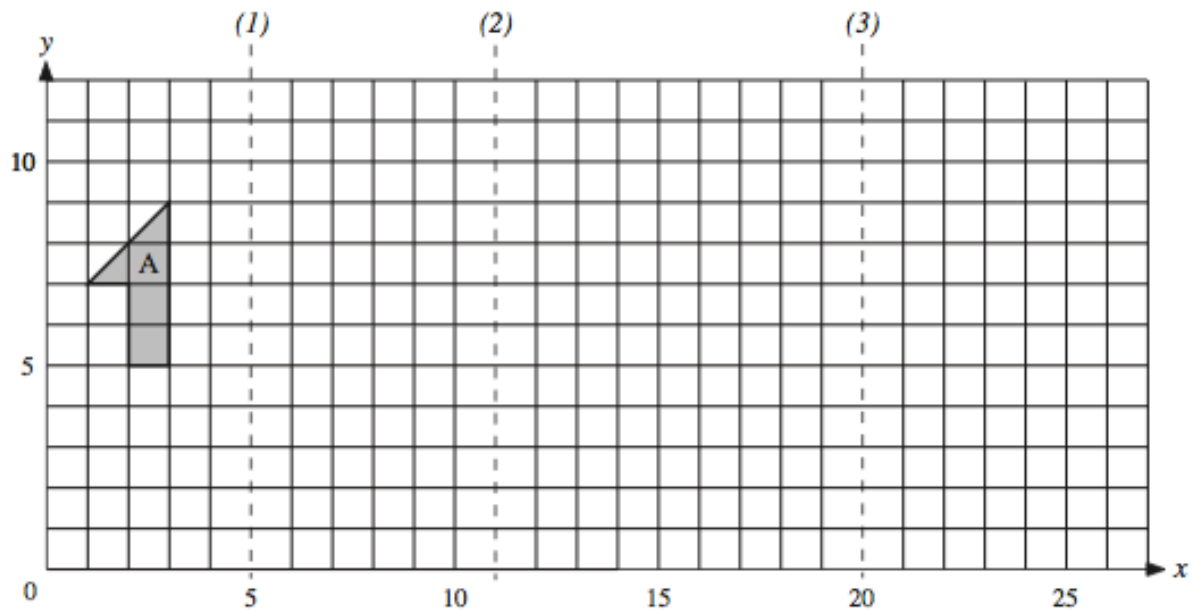
(d) Can you draw a hexagon with 4 or 5 lines of symmetry?

If so draw them, if not explain why you can't.

3. The point (4, 4) is reflected in the line $x = 6$. It's image is then reflected in the line $x = 10$. Where is the final image? What **single** reflection would have done the same job?

4.

The following diagram shows a shape, A, and mirror lines, 1, 2 and 3. Copy the diagram and then carry out the reflections and answer the question below.



Step 1. Reflect *shape A* in *mirror line 1* and label it B.

Step 2. Reflect *shape B* in *mirror line 2* and label it C.

Step 3. Reflect *shape C* in *mirror line 3* and label it D.

Step 4. *Shape D* can be obtained from *shape A* by just one reflection. Draw the required mirror line on your diagram and label it 4.

What is the equation of this line?

5. Try to **investigate** question 3 further. Can you answer the question:

The point (a, b) is reflected in the line $x = m$. It's image is then reflected in the line $x = n$. Where is the final image?

6. (a) The point $(1, 4)$ is reflected in the line $y = x$. Where is the image?

(b) The point (a, b) is reflected in the line $y = x$. Where is the image?

(c) The point (a, b) is reflected in the line $y = -x$. Where is the image?

7.

Beatrix has a 24-hour digital clock on a glass table-top next to her desk. When she looked at the clock at 13:08 she noticed that the reflected display also read 13:08.

13:08

13:08

How many times in a 24-hour period do the display and its reflection give the same time?